MEMORY FUNCTION EXAMPLE

Example: Bus master sets up DS1621 for continuous conversion and thermostatic function.

BUS MASTER MODE	DS1621 MODE	DATA (MSB FIRST)	COMMENTS
TX	RX	START	Bus Master initiates a START condition.
TX	RX	<address,0>	Bus Master sends DS1621 address; R/W = 0.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	ACh	Bus Master sends Access Config command protocol.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	02h	Bus Master sets up DS1621 for output polarity active high, continuous conversion.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	START	Bus Master generates a repeated START condition.
TX	RX	<address,0>	Bus Master sends DS1621 address; R/W = 0.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	A1h	Bus Master sends Access TH command.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	28h	Bus Master sends first byte of data for TH limit of +40°C.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	00h	Bus Master sends second byte of data for TH limit of +40°C.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	START	Bus Master generates a repeated START condition.
TX	RX	<address,0>	Bus Master sends DS1621 address; R/W = 0.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	A2h	Bus Master sends Access TL command.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	0Ah	Bus Master sends first byte of data for TL limit of +10°C.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	00h	Bus Master sends second byte of data for TL limit of +10°C.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	START	Bus Master generates a repeated START condition.
TX	RX	<address,0>	Bus Master sends DS1621 address; R/W = 0.
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	EEh	Bus Master sends Start Convert T command
RX	TX	ACK	DS1621 generates acknowledge bit.
TX	RX	STOP	Bus Master initiates STOP condition.

DS1621
Digital Thermometer and Thermostat

Manufacturer:
Dallas Semiconductor. Internet:
http://www.dalsemi.com

Features

- Temperature measurements require no external components
- Measures temperatures from –55°C to +125°C in 0.5°C increments. Fahrenheit equivalent is –67°F to 257°F in 0.9°F increments
- Temperature is read as a 9-bit value (two byte transfer)
- Wide power supply range (2.7V to 5.5V)
- Converts temperature to digital word in 1 second
- Thermostatic settings are user definable and non-volatile
- Data is read from/written via a 2-wire serial interface (open drain I/O lines)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermal sensitive system.
- 8-pin DIP or SOIC package (150 MIL and 208 MIL)

Description

The DS1621 digital thermometer and thermostat provides 9-bit temperature readings which indicate the temperature of the device. The thermal alarm output, T_{OUT}, is active when the temperature of the device exceeds a user-defined temperature TH. The output

DC ELECTRICAL CHARACTERISTICS (–55ºC to +125ºC; V_{DD}=2.7V to 5.5V)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNITS	NOTES
Thermometer Error	T_{ERR}	0ºC to 70ºC			$\pm{}^{1}/_{2}$	ºC	1
Low Level Input Voltage	V_{IL}		–0.5		0.3 V_{DD}	V	
High level Input Voltage	V_{IH}		0.7 V_{DD}		V_{DD}+0.5	V	
Pulse width of spikes that must be suppressed by the input filter	t_{SP}	Fast Mode	0		50	ms	
Low Level Output Voltage	V_{OL1}	3 mA sink current	0		0.4	V	
	V_{OL2}	6 mA sink current	0		0.6	V	
Input Current each I/O Pin		$0.4<V_{I/O}<0.9V_{DD}$	–10		10	µA	2
I/O Capacitance	$C_{I/O}$				10	pF	
Active Supply Current	I_{CC}	Temperature Conversion			1000	µA	3, 4
		E^2 Write			400		
		Communication Only			100		
Standby Supply Current	I_{STBY}				1	µA	
Thermostat Output (T_{OUT}) Output Voltage	V_{OH}	1 mA source	2.4			V	
	V_{OL}	4 mA sink			0.4	V	

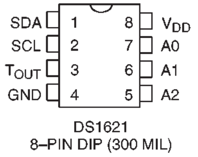
Notes:
1. Thermometer error reflects sensor accuracy as tested during calibration.
2. I/O pins of fast mode devices must not obstruct the SDA and SCL lines if V_{DD} is switched off.
3. I_{CC} specified with T_{OUT} pin open.
4. I_{CC} specified with V_{CC} at at 5.0V and SDA, SCL = 5.0V, 0ºC to 70ºC

remains active until the temperature drops below user defined temperature TL, allowing for any hysteresis necessary.
User defined temperature settings are stored in non-volatile memory, so parts may be programmed prior to insertion in a system. Temperature settings, and temperature readings are all communicated to/from the DS1621 over a simple 2-wire serial interface.

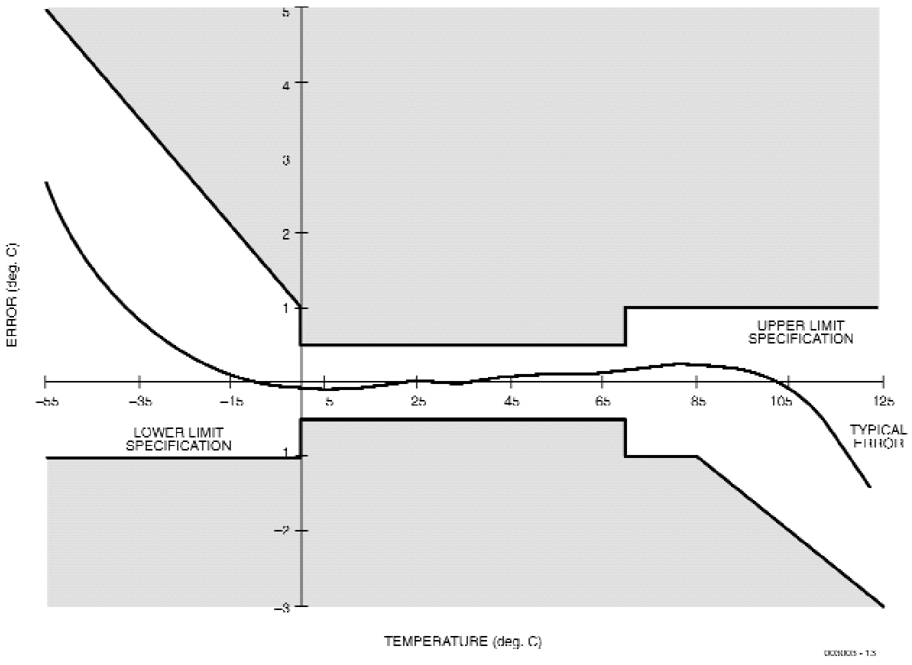
Application example
DS1621 Temperature sensor with I2C control, *Elektor Electronics* March 2000.

Pin description

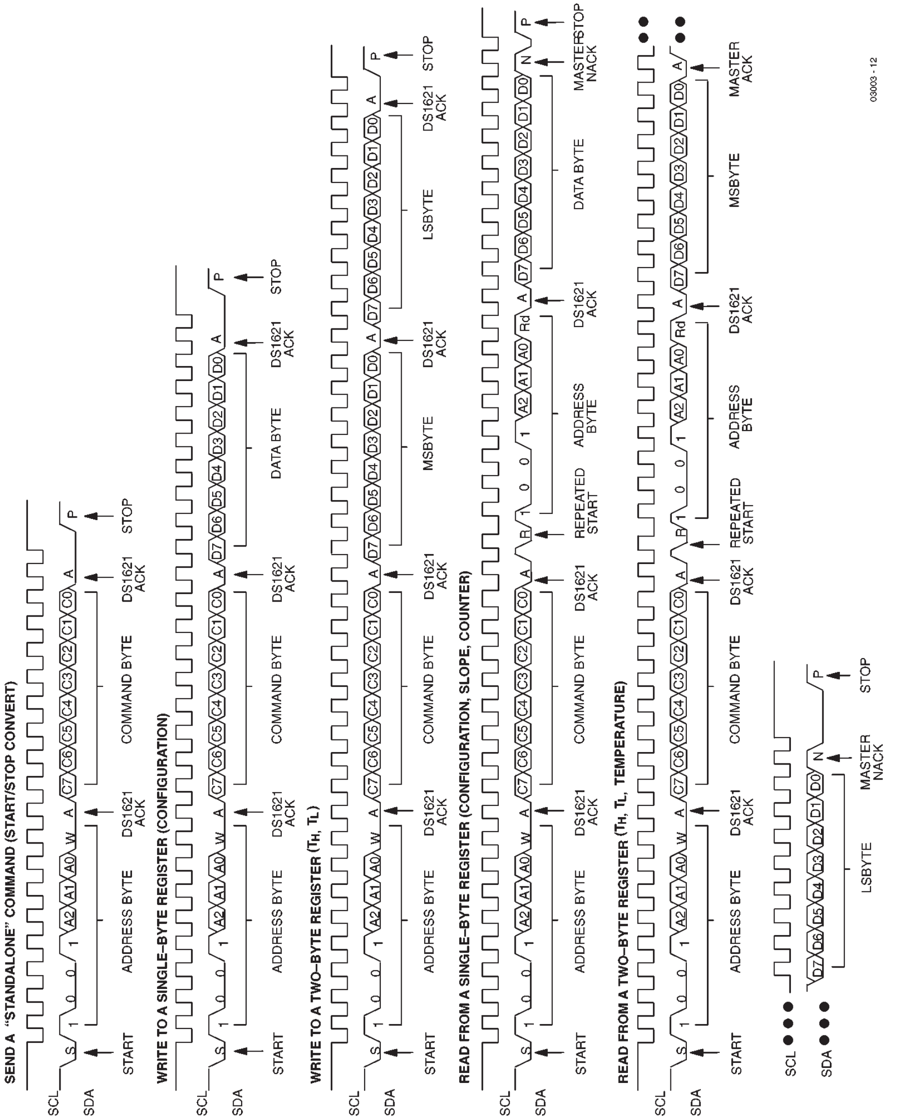
SDA	2–Wire Serial Data Input/Output
SCL	2–Wire Serial Clock
GND	Ground
T_{OUT}	Thermostat Output Signal
A0	Chip Address Input
A1	Chip Address Input
A2	Chip Address Input
V_{DD}	Power Supply Voltage



003003 - 11



Typical performance curve


SEND A "STANDALONE" COMMAND (START/STOP CONVERT)
WRITE TO A SINGLE–BYTE REGISTER (CONFIGURATION)
WRITE TO A TWO–BYTE REGISTER (TH, TL)
READ FROM A SINGLE–BYTE REGISTER (CONFIGURATION, SLOPE, COUNTER)
READ FROM A TWO–BYTE REGISTER (TH, TL, TEMPERATURE)
SCL
SDA
S 1 0 0 1 A2 A1 A0 W A C7 C6 C5 C4 C3 C2 C1 C0 A P
D7 D6 D5 D4 D3 D2 D1 D0
R 1 0 0 1 A2 A1 A0 Rd A
N
START
ADDRESS BYTE
DS1621 ACK
COMMAND BYTE
DATA BYTE
MSBYTE
LSBYTE
STOP
REPEATED START
MASTER NACK
MASTER ACK
003003 - 12

2-wire serial communication with DS1621